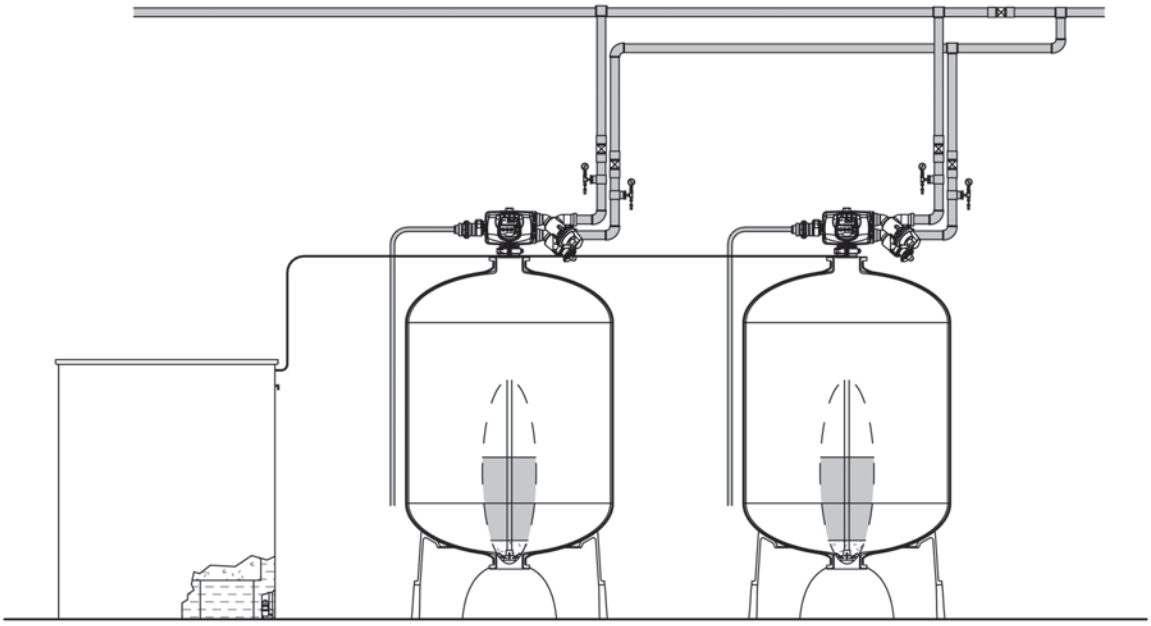
EXCALIBUR WATER SYSTEMS
2.0” HIGH CAPACITY SUPER FLOW SERIES
DUPLEX WATER SOFTENER

Installation and Operations Manual



142 Commerce Park Drive,
Units M-O, Barrie ON L4N 8W8

www.excaliburwater.com

2.0” High Capacity Premium Flow Series Water Softener:

Premium flow water softener AC adapter for European use.

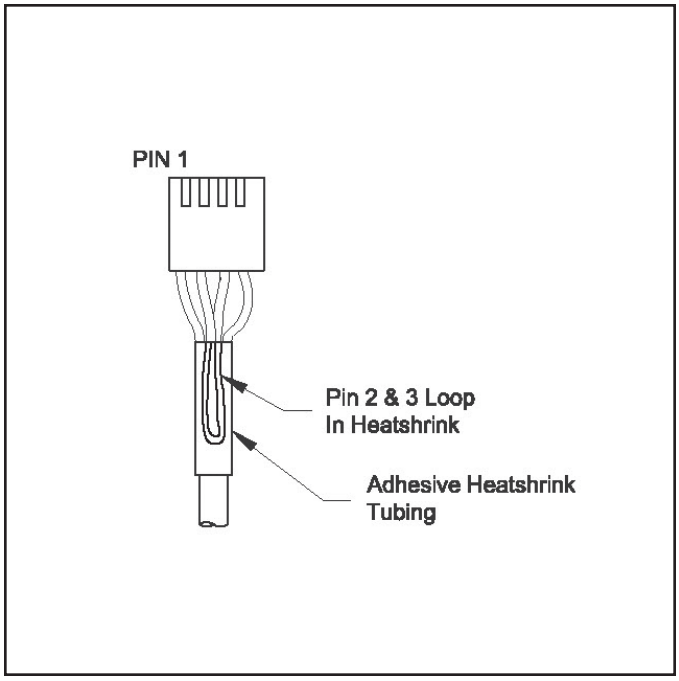
1. Water softener 220 - 240 VAC 50Hz input 24.0 VAC 750 MA output.

2. Water softener cable should be one unshielded pair of 22 AWG, UV Resistant UL2464 compliant wire.

3. Water softener connector details:

A) Terminate end with one Molex white housing.
P/N CLN 09-50-8043 and four Molex pins.
P/N CLN 08-50-0108

B) Water softener Pin 1 = 24.0 VAC
Water softener Pin 2 = Jumper to Pin 3
Water softener Pin 3 = Jumper to Pin 2
Water softener Pin 4 = 24.0 VAC Black



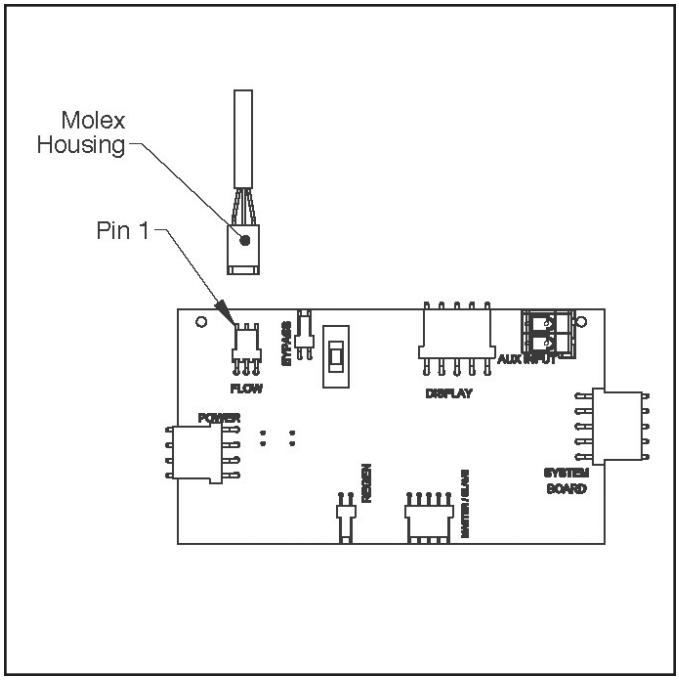
Water Softener Custom Meter Wiring:

1. Water softener terminate end with a Molex series 2695 housing, Pin 22-01-3037 and (3) Molex series 41572 (or 40445) Pins, Pin 08-65-0805 (or 97-00-44).

2. Water auxiliary meter must be able to operate on 5VDC.

Water softener Pin 1 = + 5VDC
Water softener Pin 2 (centre) = SIGNAL
Water softener Pin 3 = GROUND

3) Water softener acceptable pulse input is .1 - 999 pulse/gallon, or .4 - 519 pulses/litre.



Water Softener Optional System Board:

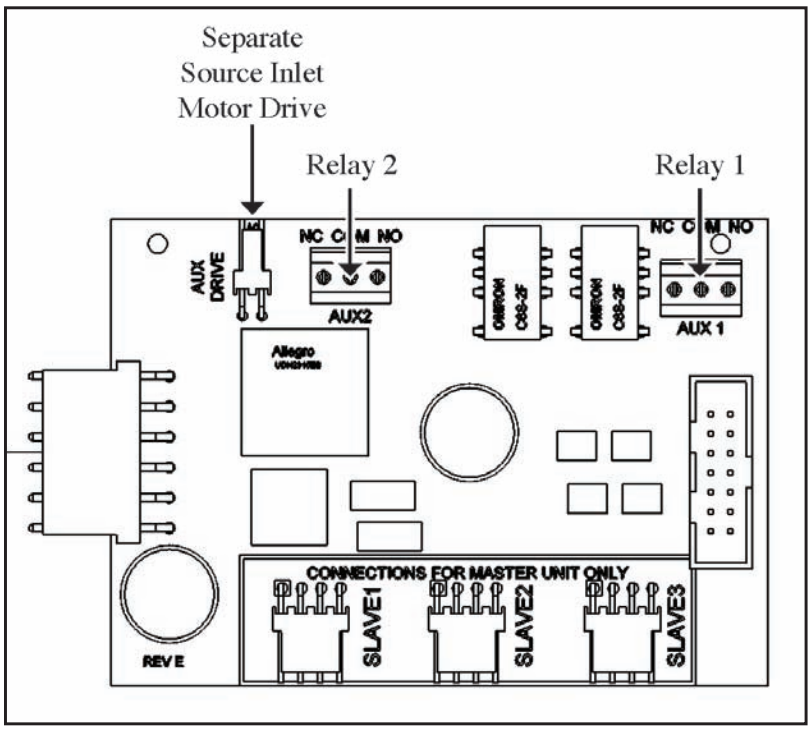
Water softener system board required for relay output and separate source inlet.

1) Water softener relay outlets 1 and 2 are normally open SPST dry contacts.

2) Water softener maximum power through water softener relays to be

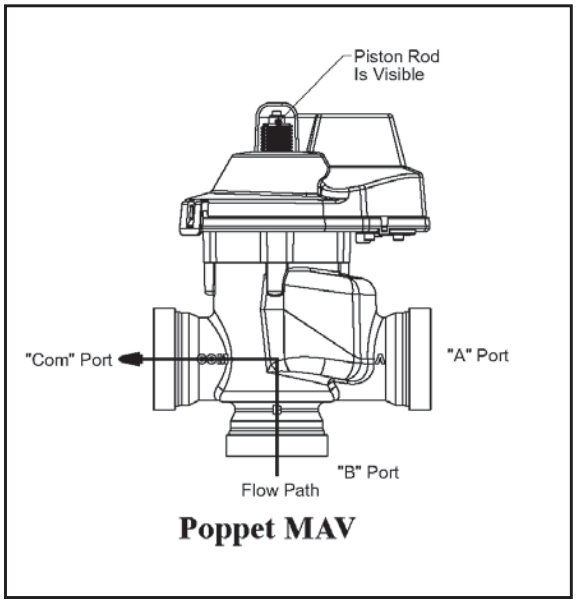
   a) 1A, 30VDC
   b) 1A, 30VAC

3) Water softener separate souce inlet dreives require connection to a P/N 3063 or P/N 3063 BSPT motorized alternating valve (MAV)



Water Softener Motorized Drive Operation:

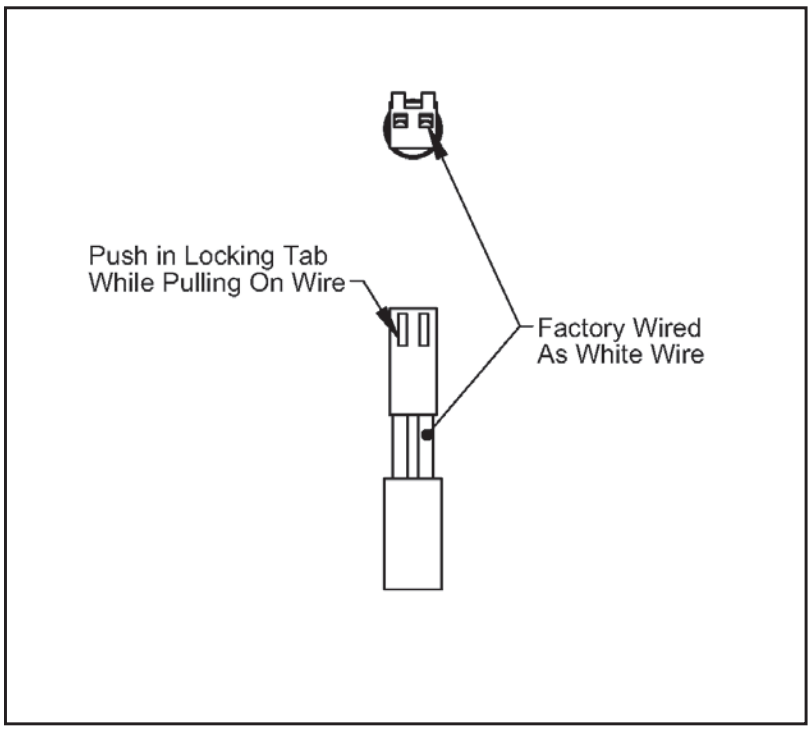
Viewing the water softener piston rod through the clear water softener clear dome is a visual indicator of the water softener drives current position. On the water softener motorized bypass drive, viewing the rod indicates that the water softener is in service. Viewing the water softener rod as shown on the water softener MAV indicates that the water softener common port is currently connected to the water softener "B" port. If the water softener rod is not visible the water softener is offline in the case of a bypass, or connected to the water softener "A" port of a MAV. This water softener drive logic is reversible to meet specific plumbing applications by reversing the polarity of the water softener drive motor wiring harness as shown below.



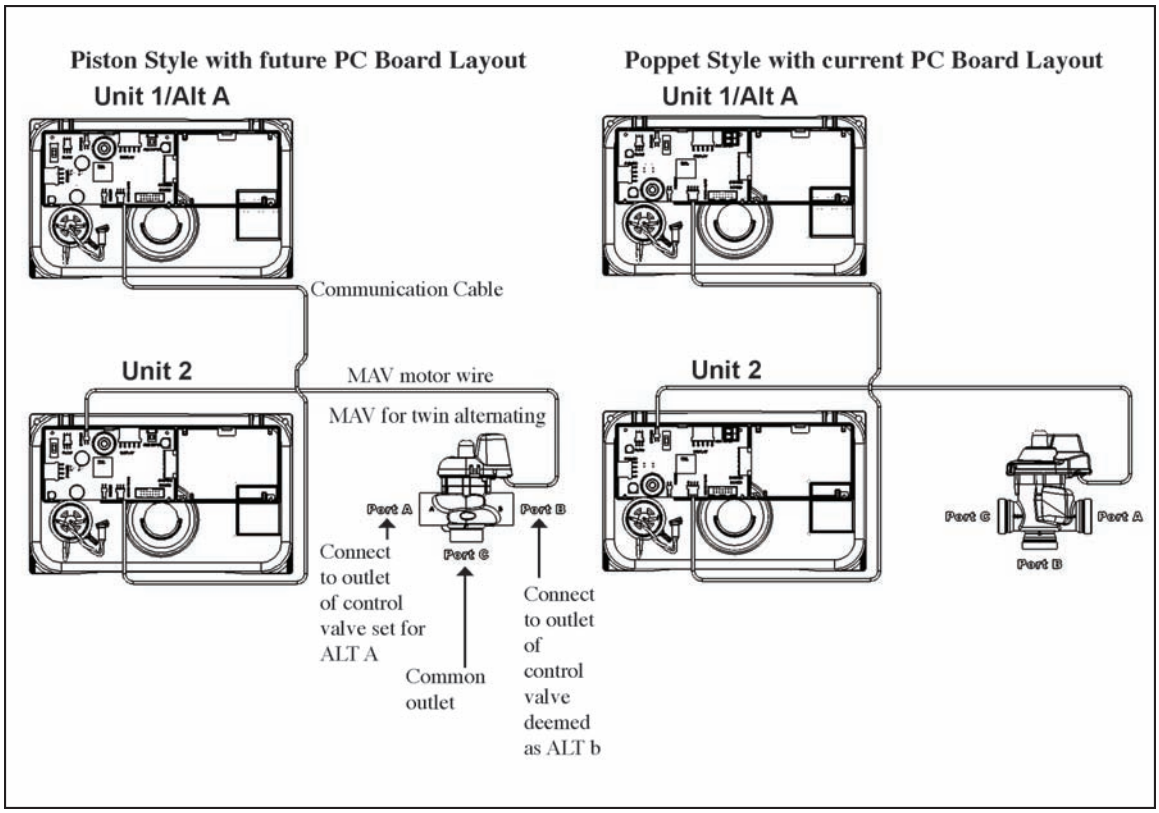
Poppet MAV

Water Softener Reversing Motorized Drive Direction:

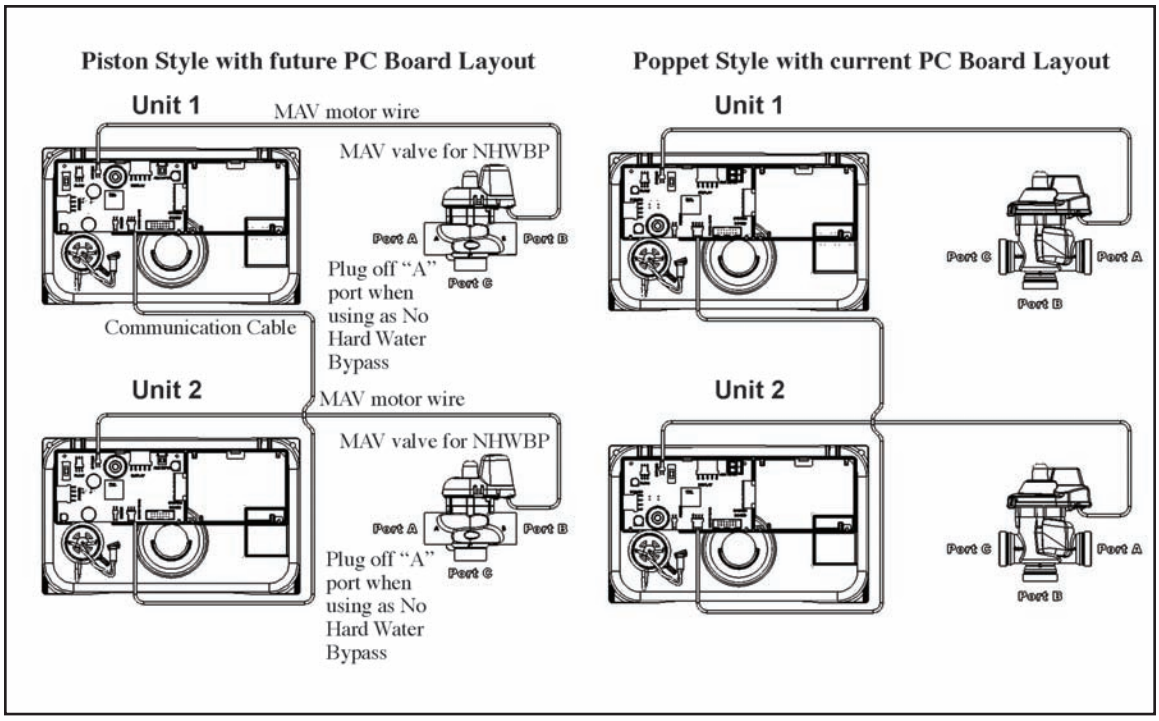
Water softener motorized bypass and water softener MAV drives are factory wired with the white wire on the right when viewing the water softener wiring harness as shown, reversing the water softener wires reverses the logic of the drive. The water softener wires can be removed from the housing by holding down the water softener locking tab in the small window while applying light pressure to the wire, being careful not to disengage the wire from its crimped on connector. The water softener wires can then be reinserted, being sure the water softener locking tab re-engages in the window.



Water Softener Wiring Diagram Examples
2 Water Softener System:

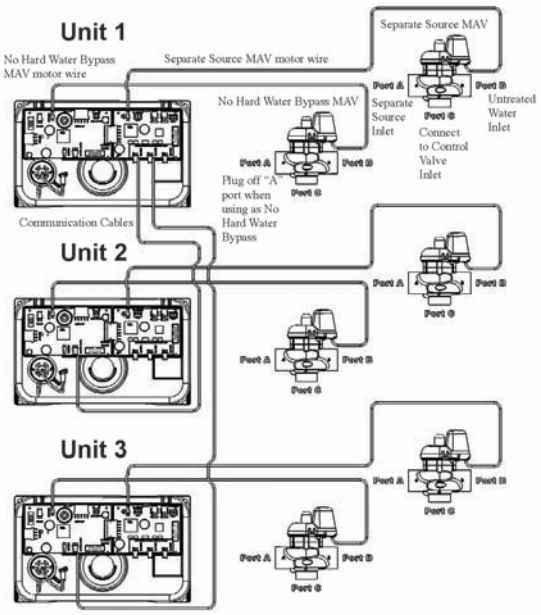


Water softener dual system with optional system optional system board for water softener relays outputs and separate source inlet.

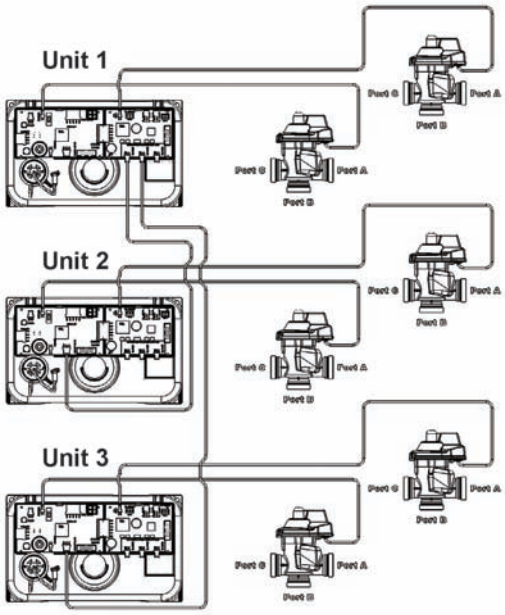


Water softener 3 and 4 unit systems with no optional system boards (4 water softener shown)

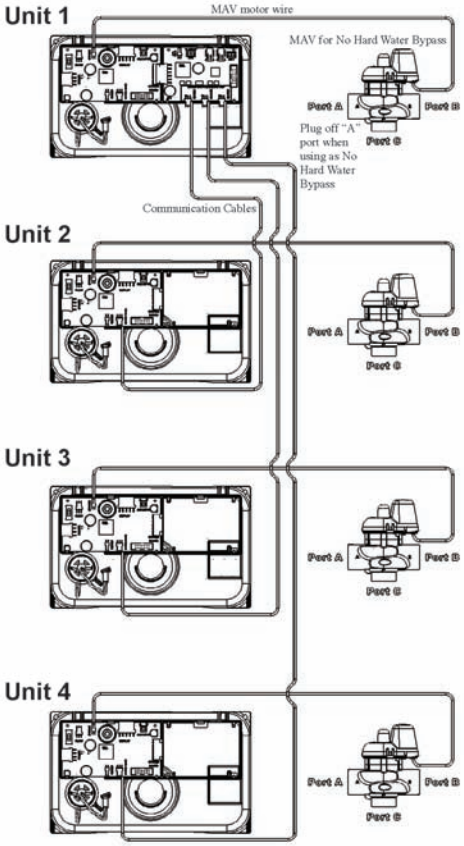
Piston Style with future PC Board Layout



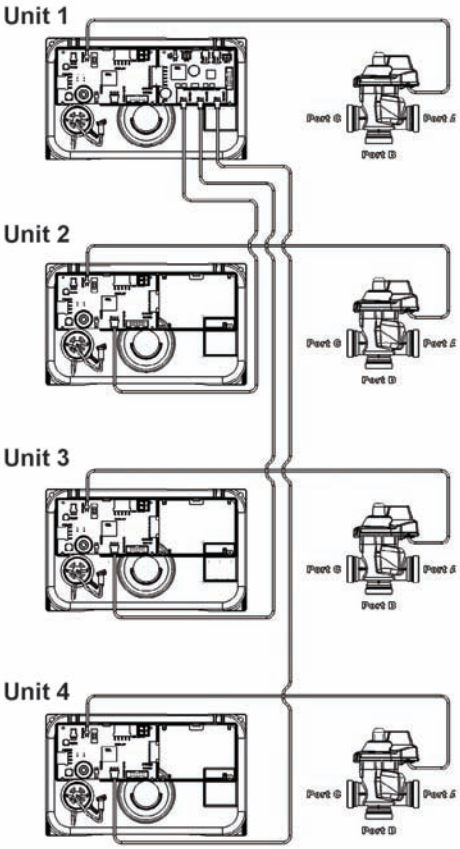
Poppet Style with current PC Board Layout



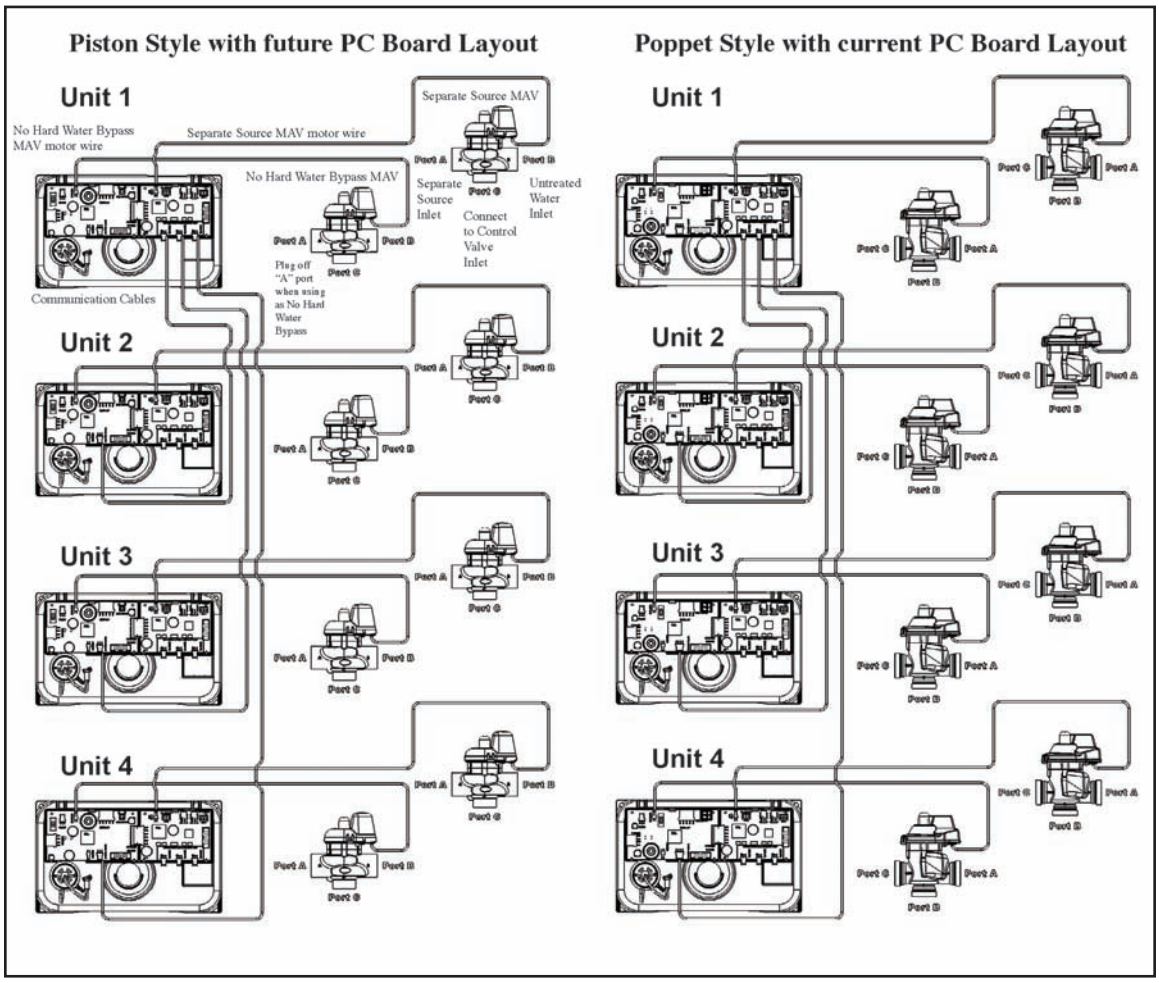
Piston Style with future PC Board Layout



Poppet Style with current PC Board Layout

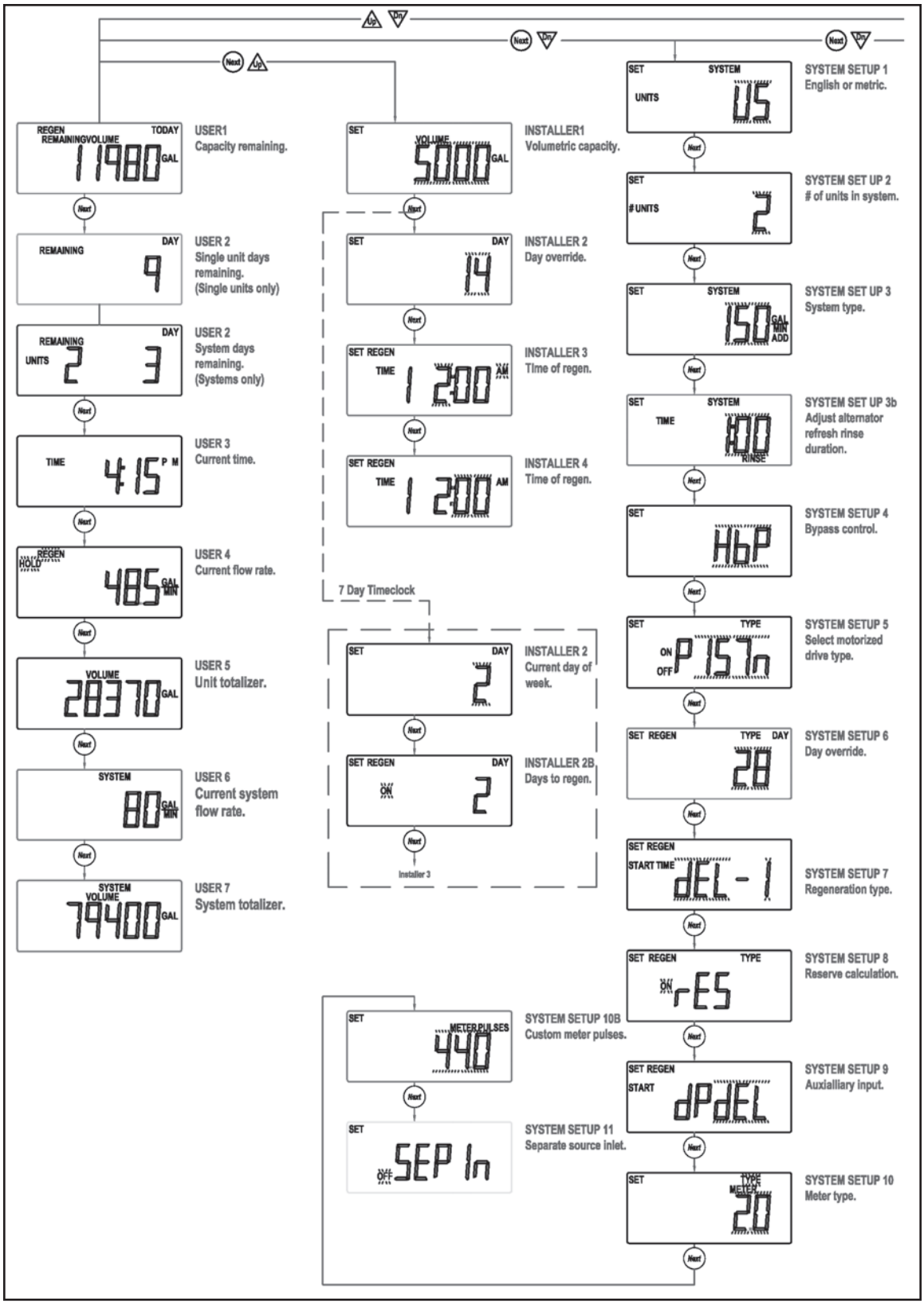


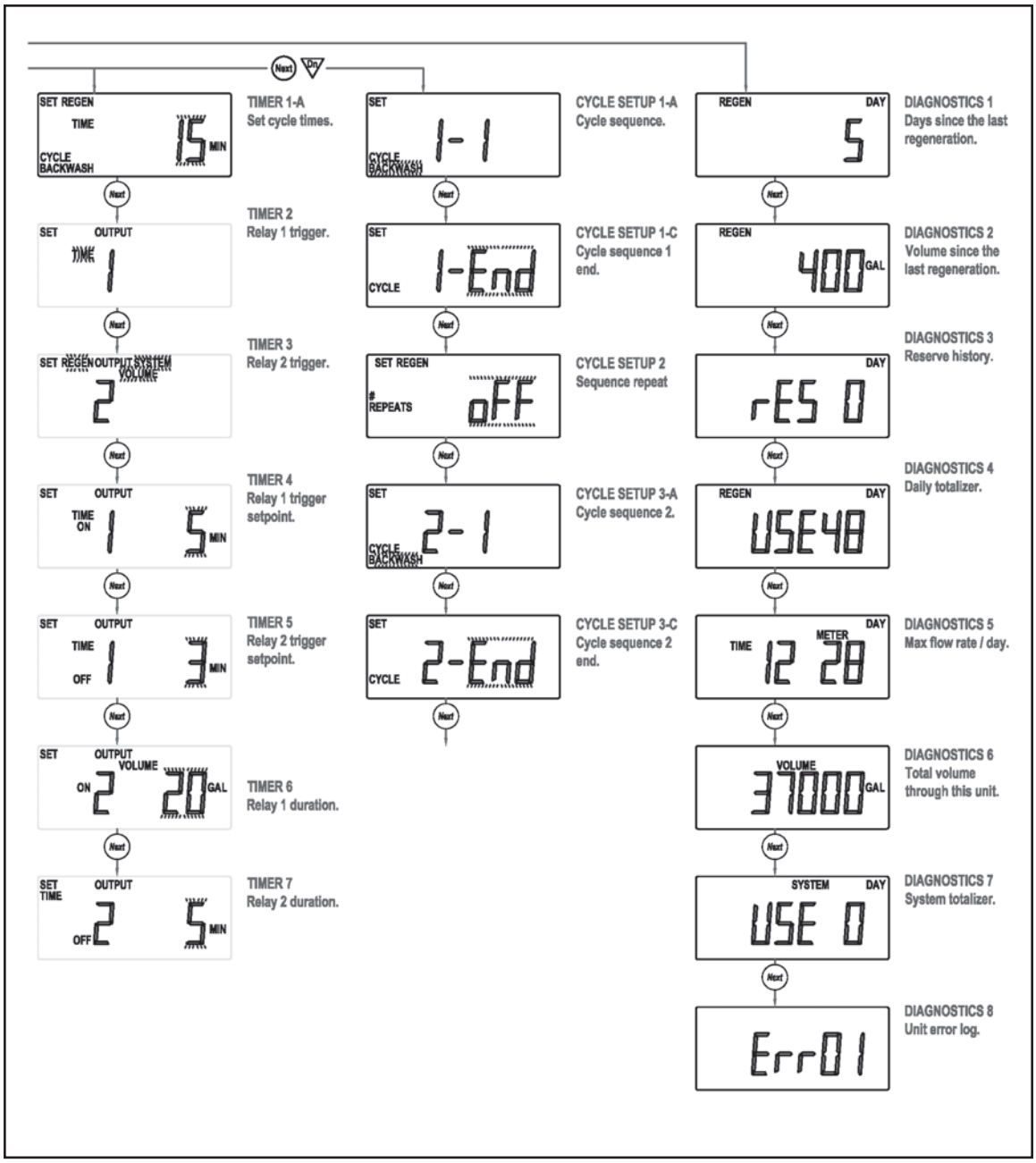
Water softener 3 and 4 unit systems with optional systems boards for water softener relay outputs and separate inlet (4 water softeners shown)



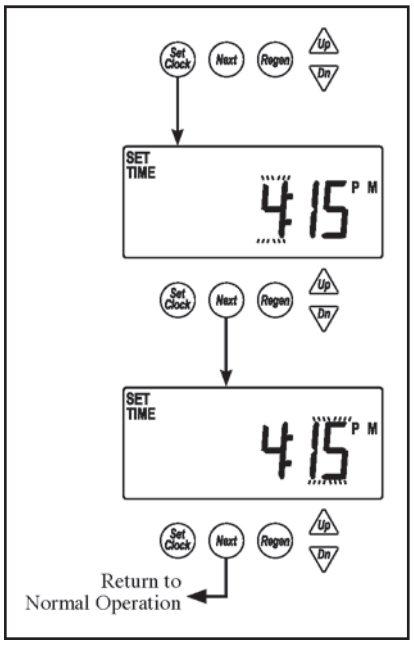
Water Softener Programming Screen Quick Reference:

1. Water softener individual screen descriptions are detailed on the following pages.
2. Some water softener screens have been omitted for clarity.

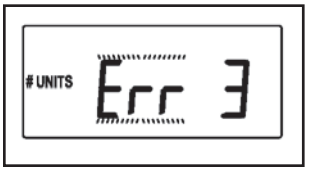

REGEN REMAINING VOLUME TODAY
11980 GAL
USER1
Capacity remaining.
REMAINING DAY
9
USER 2
Single unit days remaining.
(Single units only)
REMAINING DAY
UNITS 2 3
USER 2
System days remaining.
(Systems only)
TIME 4:15 P M
USER 3
Current time.
REGEN HOLD
485 GAL/MIN
USER 4
Current flow rate.
VOLUME
28370 GAL
USER 5
Unit totalizer.
SYSTEM
80 GAL/MIN
USER 6
Current system flow rate.
SYSTEM VOLUME
79400 GAL
USER 7
System totalizer.
SET VOLUME
5000 GAL
INSTALLER1
Volumetric capacity.
SET DAY
14
INSTALLER 2
Day override.
SET REGEN TIME
1 2:00 AM
INSTALLER 3
Time of regen.
SET REGEN TIME
1 2:00 AM
INSTALLER 4
Time of regen.
7 Day Timeclock
SET DAY
2
INSTALLER 2
Current day of week.
SET REGEN DAY
ON 2
INSTALLER 2B
Days to regen.
Installer 3
SET METER PULSES
440
SYSTEM SETUP 10B
Custom meter pulses.
SET
OFF SEP In
SYSTEM SETUP 11
Separate source inlet.
SET SYSTEM
UNITS US
SYSTEM SETUP 1
English or metric.
SET
UNITS 2
SYSTEM SET UP 2
# of units in system.
SET SYSTEM
150 GAL/MIN ADD
SYSTEM SET UP 3
System type.
SET SYSTEM
TIME 100 RINSE
SYSTEM SET UP 3b
Adjust alternator refresh rinse duration.
SET
HbP
SYSTEM SETUP 4
Bypass control.
SET TYPE
ON OFF P 15 In
SYSTEM SETUP 5
Select motorized drive type.
SET REGEN TYPE DAY
28
SYSTEM SETUP 6
Day override.
SET REGEN
START TIME dEL-1
SYSTEM SETUP 7
Regeneration type.
SET REGEN TYPE
ON rES
SYSTEM SETUP 8
Reserve calculation.
SET REGEN
START dPdEL
SYSTEM SETUP 9
Auxialliary input.
SET TYPE METER
20
SYSTEM SETUP 10
Meter type.
Next
Up
Dn


SET REGEN
TIME
CYCLE BACKWASH
15 MIN
TIMER 1-A
Set cycle times.
SET OUTPUT
TIME
1
TIMER 2
Relay 1 trigger.
SET REGEN OUTPUT SYSTEM VOLUME
2
TIMER 3
Relay 2 trigger.
SET OUTPUT
TIME ON
1 5 MIN
TIMER 4
Relay 1 trigger setpoint.
SET OUTPUT
TIME OFF
1 3 MIN
TIMER 5
Relay 2 trigger setpoint.
SET OUTPUT VOLUME
ON 2 20 GAL
TIMER 6
Relay 1 duration.
SET TIME OUTPUT
OFF 2 5 MIN
TIMER 7
Relay 2 duration.
SET
CYCLE BACKWASH
1-1
CYCLE SETUP 1-A
Cycle sequence.
SET
CYCLE
1-End
CYCLE SETUP 1-C
Cycle sequence 1 end.
SET REGEN
REPEATS
oFF
CYCLE SETUP 2
Sequence repeat
SET
CYCLE BACKWASH
2-1
CYCLE SETUP 3-A
Cycle sequence 2.
SET
CYCLE
2-End
CYCLE SETUP 3-C
Cycle sequence 2 end.
REGEN DAY
5
DIAGNOSTICS 1
Days since the last regeneration.
REGEN
400 GAL
DIAGNOSTICS 2
Volume since the last regeneration.
DAY
rES 0
DIAGNOSTICS 3
Reserve history.
REGEN DAY
USE48
DIAGNOSTICS 4
Daily totalizer.
TIME METER DAY
12 28
DIAGNOSTICS 5
Max flow rate / day.
VOLUME
37000 GAL
DIAGNOSTICS 6
Total volume through this unit.
SYSTEM DAY
USE 0
DIAGNOSTICS 7
System totalizer.
Err01
DIAGNOSTICS 8
Unit error log.

Water Softener Setting Time of Day:



Water softener set time accessed by pressing set lock while in the water softener user screen. Use the up and down water softener arrows to scroll hours. This water softener AM/PM alternates at midnight.



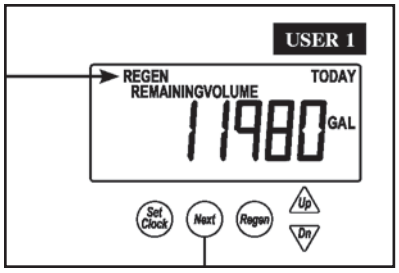
Water softener count error and the water softener number will flash when it is not detected. Pressing any button will return the user to the water softener set up screen to correct the valve.

Water softener error screen:
Water softener error and the code alternate. The water softener returns and flashes it's 3 LED's. The water softener continues to try and function, but must be reset to correct the water softener error screen.

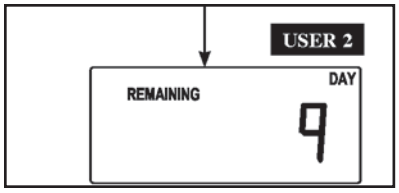
Water Softener Typical User Screens:

Water softener regen today wil display when a regeneration is scheduled or flash for a manually set regeneration.

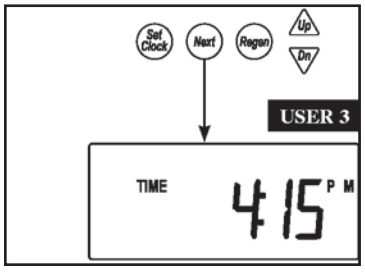
Water softener user 1 displays capacity remaining. Does not display if volumetric capacity is set to OFF.



Water softener capacity remaining can be adjusted in 10 gallon increments by holding the water softener down arrow for > 3 seconds.

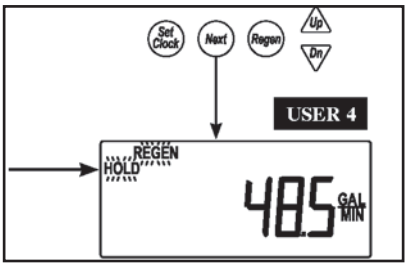


Water softener displays days remaining does not display if days override is set to OFF. The water softener days remaining can be decremented one day at a time by holding the water softener down arrow > 3 seconds.



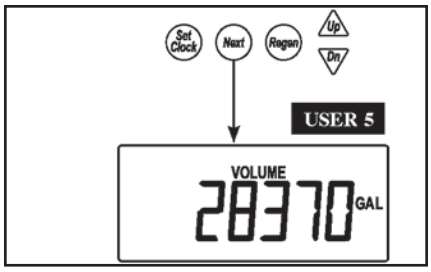
Water softener displays time of day.

Water softener hold or start regen will flash in all user screens while the water softener auxiliary input is activated

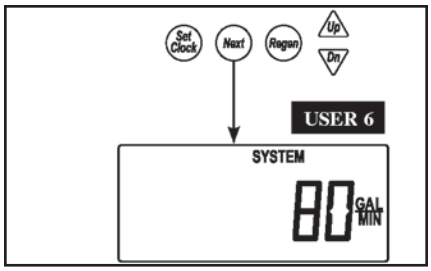


Water softener displays the current flow rate.

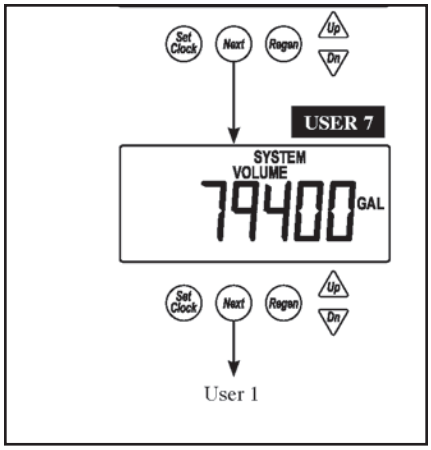
Water Softener Typical User Screens Continued:



Water softener displays total water softener volume since install/reset individually re-settable using history reset sequence.



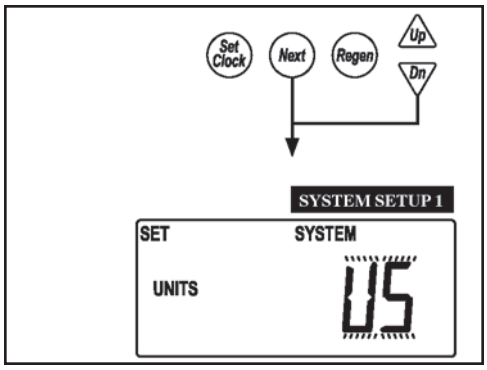
Water softener displays the water softeners current system flow rate. The water softener does not display on single tank water softeners.



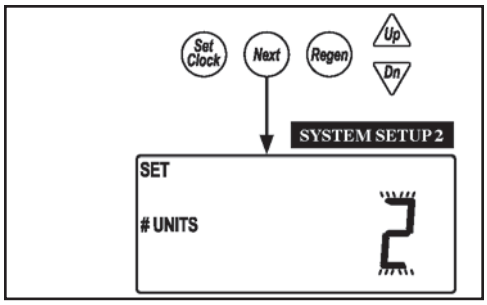
Water softener total system volume since install/reset individually re-settable using history reset sequence. The water softener does not display on single tank water softener.

Water Softener System Set Up Screens:

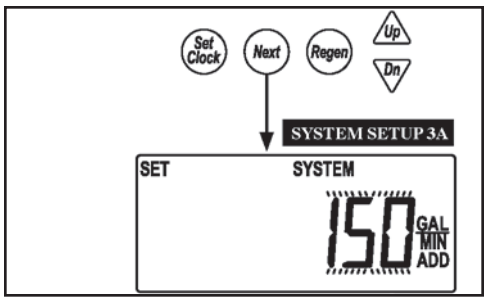
Water softener accessed by pressing next and down simultaneously for > 3 seconds.



Water softener select country US or SI. This sets the water softener use of 12 or 24 hour clock and the water softener display of gallons or litres.



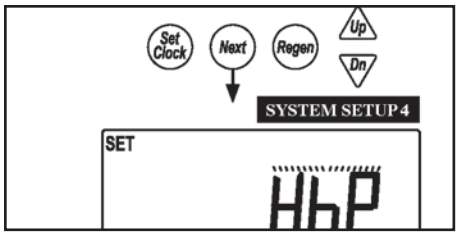
Select the water softener total number of water softener tanks from 1 - 4, in a water softener system. This water softener screen will only allow 1 or 2 if a water softener system board is not installed.



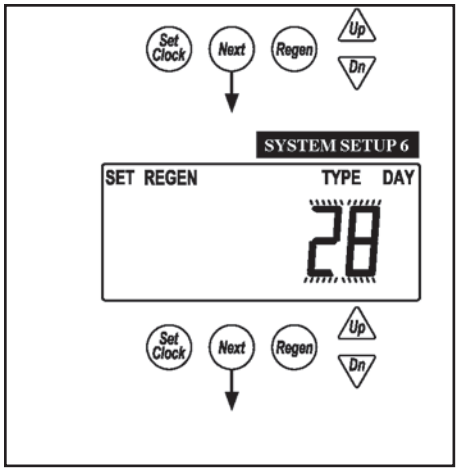
Select water softener flow rate and water softener add point.

1. If water softener is set to "0", all the water softeners are online, unless one is regenerating.
2. If the water softener is greater than 0, the water softener acts as an alternator water softener, keeping one water softener offline at all times. The water softener screen will not display if set to one water softener.

Progressive Flow Unit		
Units	**Range**	**Increments**
US (GAL)	0-499	1
SI (L)	0-1896	4



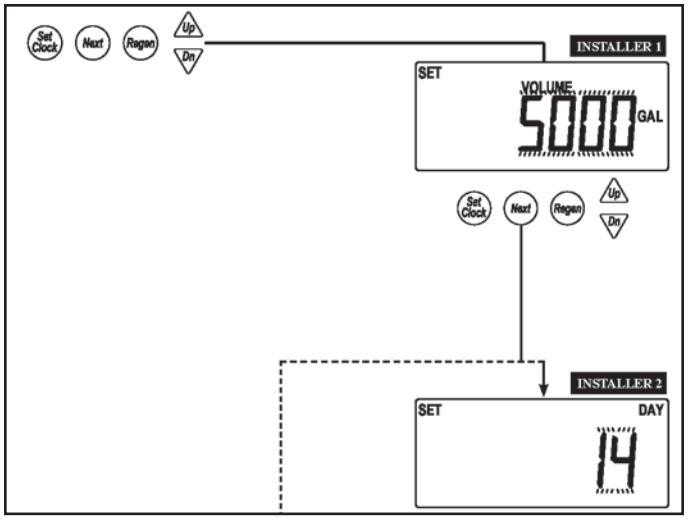
Single water softeners have a selection of hard water bypass, no hard water bypass or water softener relay operation. When the water softeners start to regenerate, the water softener hard water bypass will allow hard water bypass, no hard water bypass or water softener relay and two water softeners alternators have an additional selection of ALT-A setting the water softener no hard water bypass requires a motor driven water softener bypass. The water softener ALT-A requires a motor driven alternator valve on the controlling water softener and relay relies on external valving for no hard water bypass control.



The water softener select day control type, time clock 1-28 days, time clock 7 day, or OFF. When the water softener volumetric capacity is set, volume regeneration can be combined with time clock control. OFF will not be an option if volumetric capacity is off.

Water Softener Installer Setup Service Returns to Normal Operation After 5 Minutes:

The water softener is accessed by pressing the water softener next and down simultaneously for > 3 seconds.

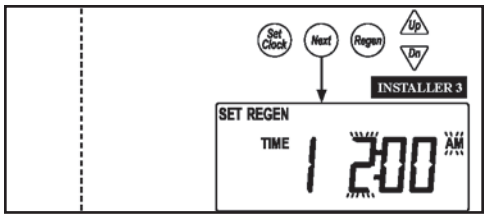


Installer 1:

Set water softener volumetric capacity or OFF. OFF will not be an option if the water softener day control is set to OFF. x 1000 water softener illuminates at 10,000 gallons.

Set water softener current day and regen days when the water softener is set as a 7 day time clock or hybrid in system setup 1.

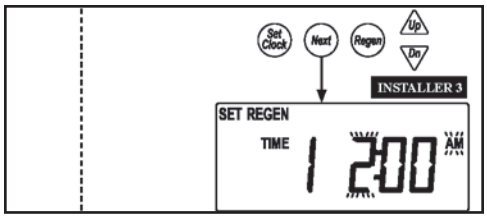
Units	Range	Increments
US (GAL)	10-10,000 10,000-100.00 x 1000 100.00-999.00 x 1000	10 100 1000
SI (L)	50-50,000 50,000-50.00 x 1000 500.00-5000.0 x 1000	50 50 5000



Installer 2:

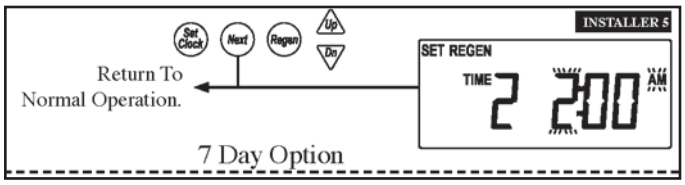
Set water softener day override 1-28 days between regenerations, or if the water softener is set to 7 day time clock, see 7 day water setup below. OFF will display if selected in water softener day control screen installer 3.

Select water softener time of regen. Use water softener up and down arrows to scroll hours AM/PM water softener alternates at midnight "ONO" will be displayed on water softener with no time dependent regen control.



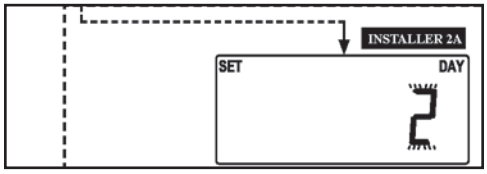
Installer 4:

Select water softener time of regen. Use water softener up and down arrows to scroll minutes.



Installer 5:

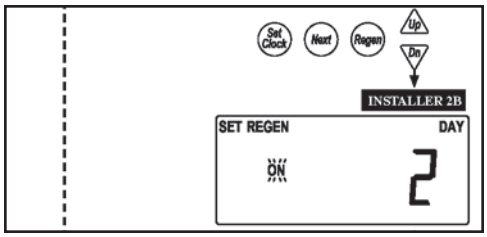
Select water softener time of 2nd water softener regen (if configured as a multiple regenerating water softener).



Installer 2:

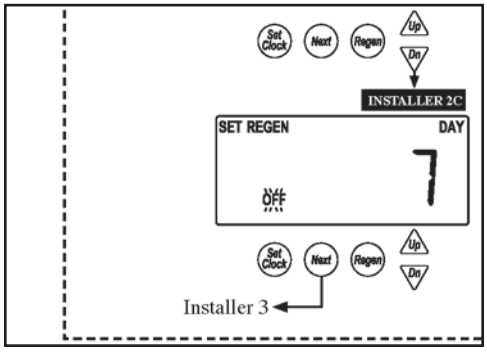
Water softener 7 day time clock option to set water softener current day of the week.

1 - Sunday
2 - Monday
3 - Tuesday
4 - Wednesday
5 - Thursday
6 - Friday
7 - Saturday



Installer 2B:

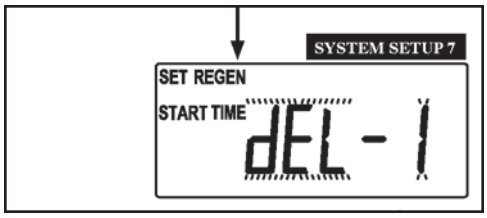
Water softener scroll through days 1 - 7 using the water softener up and down arrows. Pressing the water softener set clock will toggle the water softener regen ON or OFF for that day (ie; regen is on Monday)



Installer 2C:

(ie; no water softener regeneration on Saturdays)

Water Softener Setup Screens Continued:

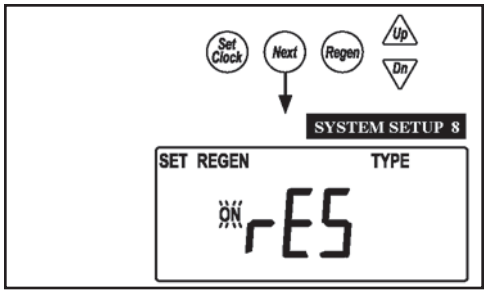


System Setup 6:

Select water softener regeneration type

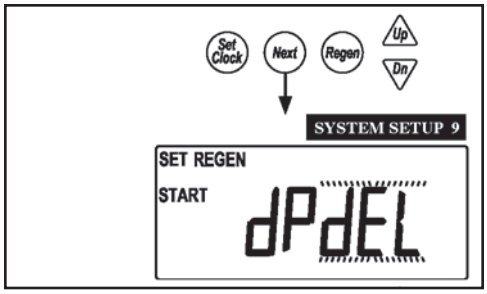
Water softener delayed (DEL-1)
Water softener delayed (DEL-2)
Water softener delayed (DEL-3)
Water softener delayed (DEL-4)
ONO

Water softener delayed with multiple regenerations allowed per day would be used either to reduce the water softener reverse volume, or to accommodate a small water softener system relative to the treatment demand.



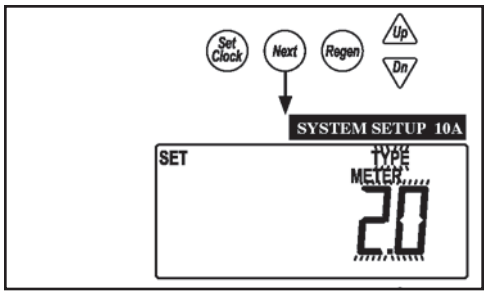
System Setup 7:

Select water softener reserve calculation ON or OFF. OFF will schedule a regen when the water softener volumetric capacity reaches 0. This water softener screen will not display for "ONO"
Water softener delayed with multiple regenerations allowed per day would be used either to reduce the water softener reverse volume, or to accommodate a small water softener system relative to the treatment demand.



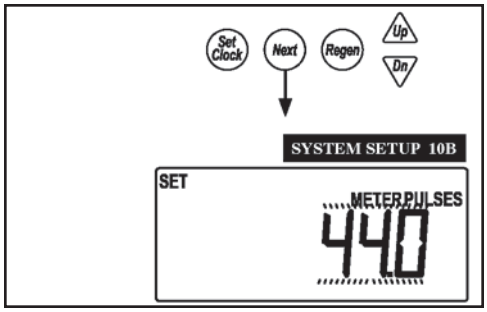
System Setup 8:

Set water softener auxiliary initiated regen. Start water softener time regen. Regeneration will start immediately after 2 cumulative minutes of switch closure. Start water softener regen: Regeneration will start immediately upon switch closure. Start water softener regen del: regeneration will start at the water softener delayed time upon closure.
Hold water softener regen:
Regeneration will not be allowed as long as there is switch closure.



System Setup 9:

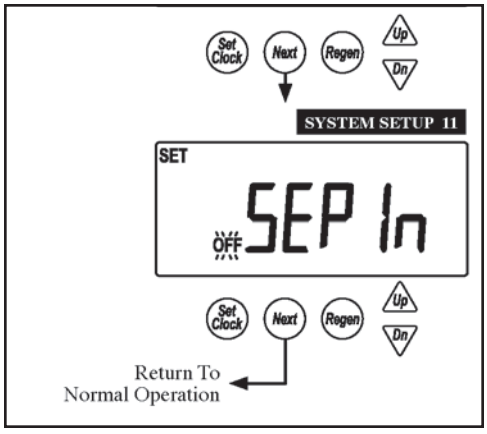
Select water softener meter type or pulses.
Water softener 2.0 meter (type)
Water softener 1.5 meter (type)
Water softener system pulses.



System Setup 9B:

Select water softener meter type pulses. Water softener screen does not show if pulses or water softener system pulses is not selected in the previous water softener screen.

	Pulses / Unit Flow	
Units	Range	Increment
US (Pulse/Gal)	0.5 - 80.0 90.0 - 500.0	0.5 2.0
SI (Pulse/L)	0.1 - 20.0 20.0 - 150.0	0.1 0.5

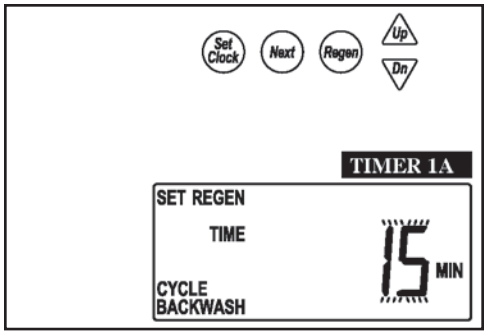


System Setup 10:

Water softener separate source inlet. This water softener screen will not display if a water softener system board is not installed.

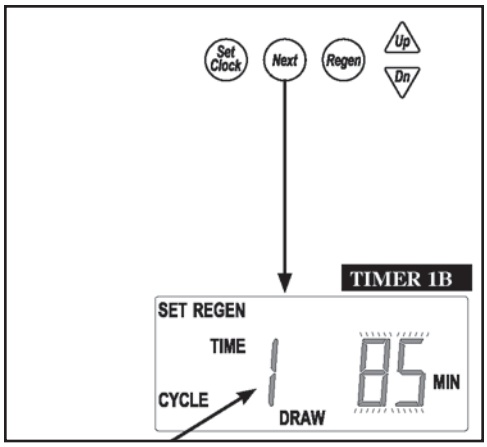
Water Softener Time Screens Water Softener Returns to Normal Operation After 5 Minutes:

Water softener is accessed by pressing the water softener next and down simultaneously for > 3 seconds, then by pressing next and down simultaneously again for > 3 seconds.



Timer 1 - A:

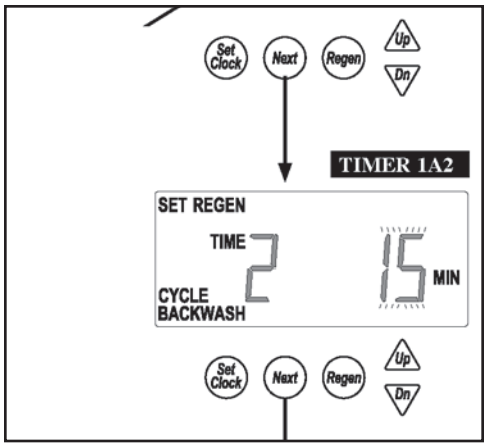
Select water softener time of cycle 1.



The water softener press next and down reset from this screen unlocks the setup screens.

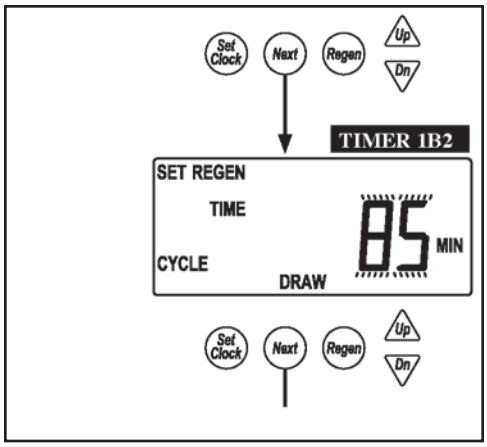
Timer 1 - B:

Select water softener time of cycle 2. “1” is displayed if the water softener is set for more than one sequence.



The following water softener screens only show if the water softener is programmed for multiple water softener regenerations in the cycle setup 2 screen.

Timer 1 - A2
Water softener select time of alternate regen cycle 1

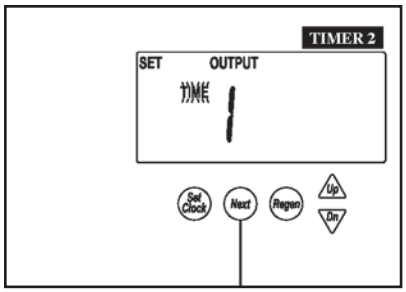


Timer 1 - B2

Select water softener timer of alternate regen cycle 2.

Cycle	Units	Range	Increments
Backwash	Minutes	1-30 30-95	1 5
Draw	Minutes	1-30 30-100 100-180	1 5 10
Slow Rinse	Minutes	1-30 30-95	1 5
Rinse	Minutes	1-30 30-95	1 5
Fill	Minutes	0.1-10.0 10.0-30.0 30.0-99.0	0.1 0.2 1.0
Hold	Minutes	1-30 30-100 100-480	0.1 2.0 10.0

Water Softener Timer Screens Continued:



Timer 2:

Set water softener output 1, these water softener settings will only be allowed with water softener system board installed.

Time: Water softener relay is turned on after the water softener specified time from the start of the water softener regeneration and is left on for a specified time.

Cycle: Water softener relay is turned on after the water softener starts on a specified cycle and is left on for a specified time.

Volume: The water softener relay is turned on, during the water softener service flow only. Every specified number of water softener volume units and is left on for a specified time.

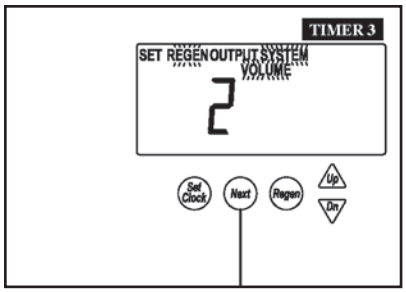
Volume and Regeneration: The water softener relay is turned on every specified number of water softener units and is left on for a specified time.

STBY: The water softener relay would be used to control external valving, closing for water softener regeneration, and is left on for a specified time.

REGEN: The water softener relay closes when the water softener is in regeneration.

ERR: The water softener relay closes when the water softner is in any error mode.

Water Softener Timer Screens Continued:



Timer 3:

Set water softener output 2, these water softener settings will only be allowed with water softener system board installed.

Time: The water softener relay is turned on after the water softener starts on a specified time from the start of water softener regeneration and is left on for a specified time.

Cycle: The water softener relay is turned on after the start of a specified water softener cycle and is left on for a specified time.

Volume: The water softener relay is turned on, during the water softener service flow only. Every specified number of water softener volume units and is left on for a specified time.

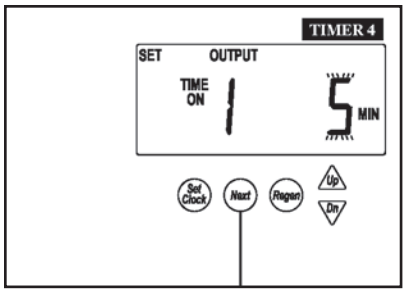
Volume and Regeneration: The water softener relay is turned on every specified number of water softener volume units and is left on for a specified time.

STBY: The water softener relay would be used to control external valving, closing for water softener regeneration or when the water softener would be offline in systen operation.

REGEN: The water softener relay closes when the water softener is in regeneration.

ERR: The water softener relay closes when the water softner is in any error mode.

Water Softener Timer Screens Continued:



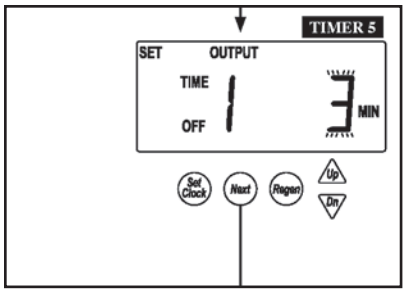
Timer 4:

Select water softener output 1. On water softener trigger set point per water softener previously selected. This water softener screen will not display if the water softener does not have a water softener system board, or if the water softener STBY was selected as the trigger.

Time: The water softener time after the start of water softener regen before switch is closed.

Cycle: Select a water softener cycle which will close water softener output 1.

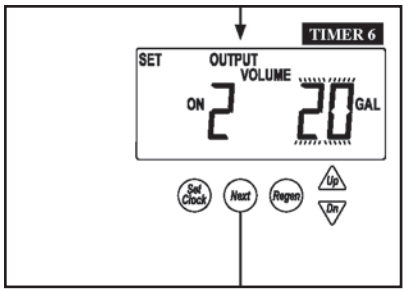
Volume: The water softener volume of water interval during service between water softener switch closures. The water softener timer 4 and 6 screens will not display if the water softener display if STBY, REGEN, or ERR are selected in water softener timer 2 and 3.



Timer 5:

Select water softener output 1 on duration before turning off. This water softener screen will not display if the water softener does not have a water softener system board.

Water Softener Timer Screens Continued:



Timer 6:

Select water softener output 2, on water softener trigger set point, per water softener previously selected. This water softener screen will not display if the water softener does not have a water softener system board, or if STBY was selected as the water softener trigger.

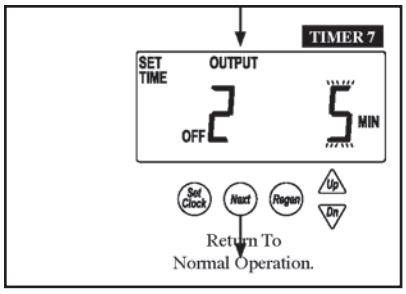
Time: The water softener time after the start of water softener regen before the water softener switch is closed.

Cycle: Select a water softener cycle which will close the water softener output 2.

Volume: The water softener volume of water interval during service between water softener switch closures.

Relay Trigger Settings				
Trigger	Units	Range	Increment	Default
Time	Minutes	0 - 240	1	10
Cycle				Slow Rinse
Volume	Gallons	1 - 200 200 - 1000 1000 - 10000	1 5 10	20
Volume	Liters	5 - 750 750 - 4000 4000 - 38000	5 20 40	75
Relay Duration Settings				
Trigger	Units	Range	Increment	Default
Time	Minutes	:01 - 2:00 2:00 - 20:00 20 - 240	:01 :05 1	3:00

Water Softener Timer Screens Continued:



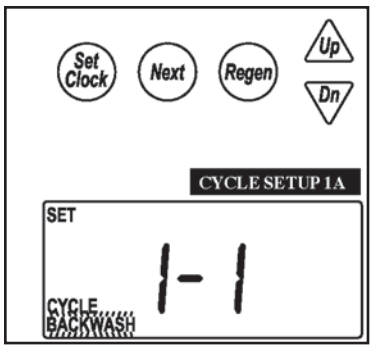
Timer 7:

Select water softener output 2 on duration before turning off. This water softener screen will not display if the water softener does not have a water softener system board.

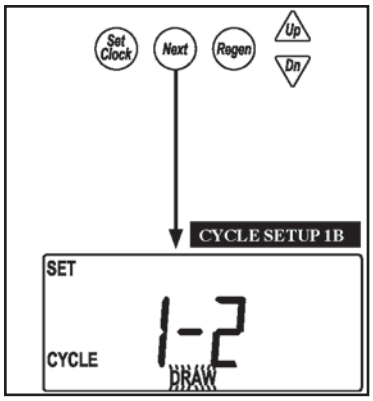
Water Softener Cycle Setup Screens:

Water softener returns to normal operation after 5 minutes.

Water softener is accessed by pressing water softener next and down buttons simultaneously for > 3 seconds, then by pressing water softener next and down buttons simultaneously again for > 3 seconds, then by pressing water softener next and down buttons simultaneously again for > 3 seconds a third time.

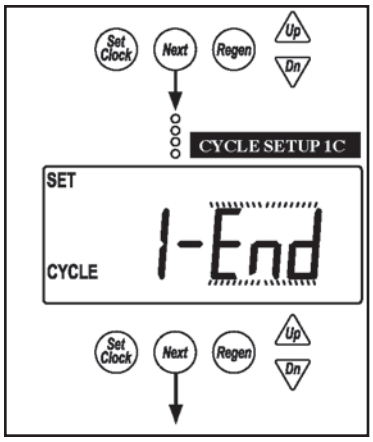


Water softener cycle setup 1 - A
Select water softener first cycle.



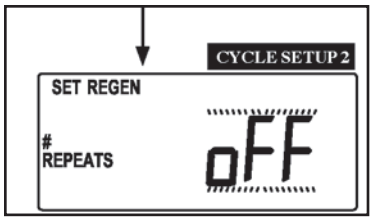
Water softener cycle setup 1 - B
Select water softener second cycle.

Cycle #	Cycle Default
1	Backwash
2	Draw
3	2nd Backwash
4	Rinse
5	Fill
6	End



Water softener cycle setup 1 - C
After water softener cycles are configured, a water softener end is added. Water softener (9 cycles maximum)

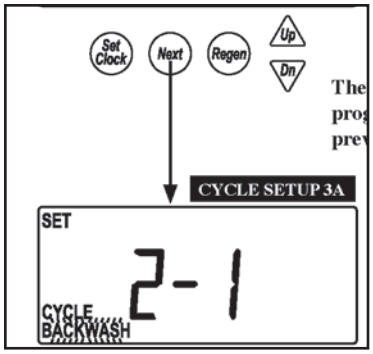
Water Softener Cycle Setup Screens Continued:



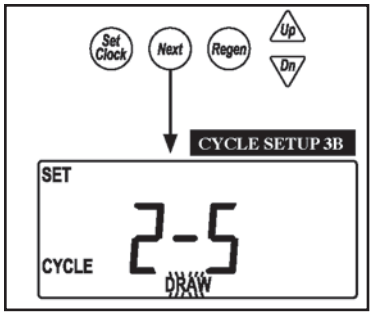
Water softener cycle setup 2.

Water softener select regeneration repeats, 1 - 10 or OFF. Water softener repeats regeneration cycle sequence 1 as selected number of times before water softener regenerates a single time with sequence 2.

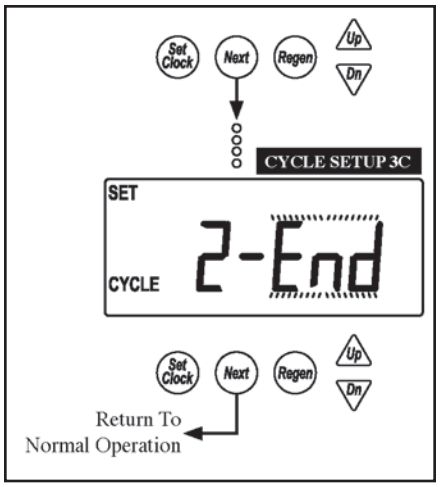
The following watre softener screens only show if the water softener is programmed for multiiple water softener regenerations in the previous water softener screens.



Water softener cycle setup 3 - A
Select water softener first cycle of “alternate” water softener regeneration sequence.



Water softener cycle setup 3 - B
Select water softener second cycle of alternate water softener regeneration sequence.



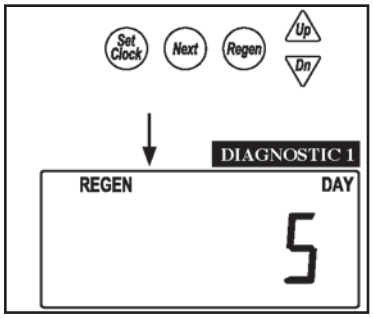
Water softener cycle setup 3 - C
After water softener cycles are configured, a water softener end is added, water softener (9 cycles maximum)

Water Softener Diagnostic Screens:

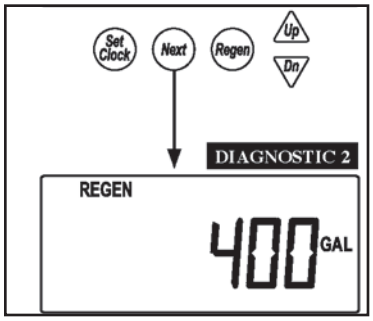
Return water softener to normal operation after 5 minutes.

Water softener is accessed by pressing water softener next and down buttons simultaneously for > 3 seconds.

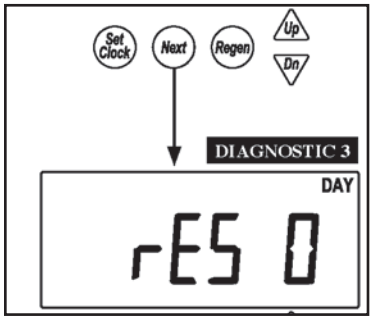
All water softener diagnostic history screens are resettable with the water softener history reset sequence while in the water softener diagnostics 1 screen. Holding the water softener set clock and water softener regen buttons for > 3 seconds initiates a totalizer or history reset.



Water softener diagnostics 1
= days since the last water softener regeneration

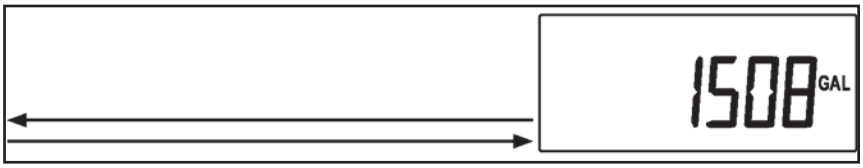


Water softener diagnostics 2
Water softener gallons or litres since the last water softener regeneration



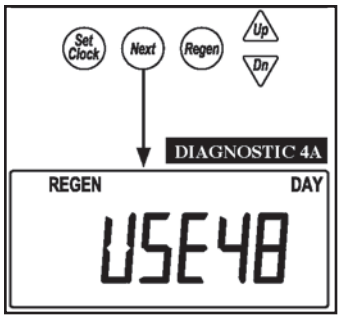
Water softener diagnostics 3
Water softener reserve history - this water softener screen onlly appears if valve is set to calculate water softener reserve in water softener setup 7. Use arrows to select water softener A day. 0 = today, 1 = yesterday, 6 = 6 days ago (MAX)

Water softener reserve valve.



Water softener automatically toggles

Water Softener Diagnostic Screens Continued:

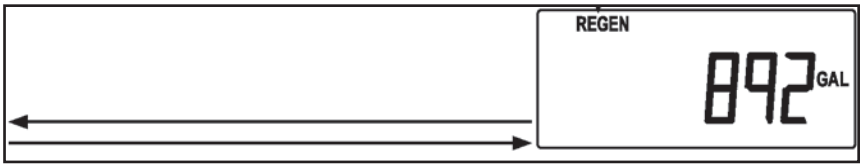


Water softener diagnostics 4
Water softener history of volume used
Use water softener arrows to select A day

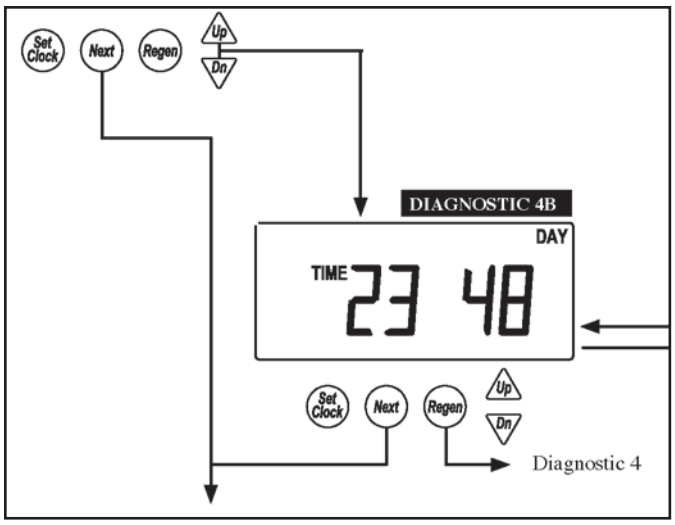
0 = today
1 = yesterday
63 = 63 days ago (MAX)

Water softener regen will display if a water softener regeneration occurs that day.

Water softener gallons used



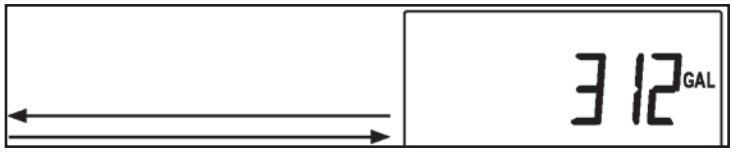
Water softener automatically toggles



Simultaneously press water softener up and down buttons

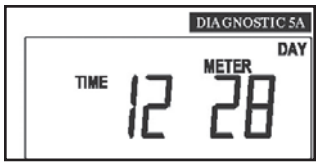
Water softener diagnostics 4 - B
The water softener hourly history of water softener volume use.
Use the water softner up and down buttons to select the water softener hours of the day from water softener screen 4.

Water softener volume used within the water softener selected hour.



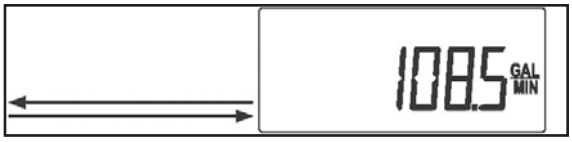
Water softener automatically toggles

Water Softener Diagnostic Screens Continued:

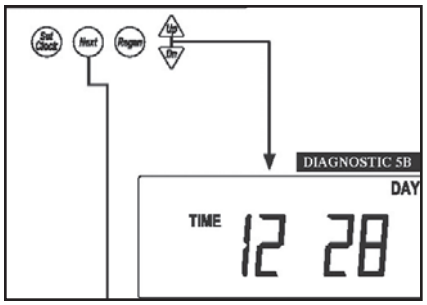


Water softener diagnostics 5
The water softener maximum flow rate for the last 28 days.

The water softener maximum flow rate of the day.



Water softener automatically toggles



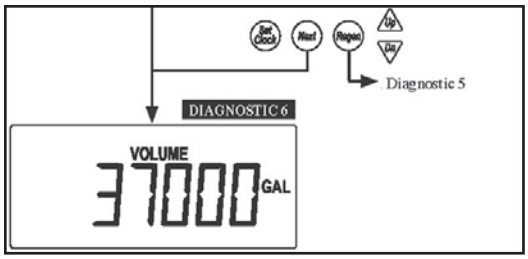
Simultaneously press the water softener up and down buttons.

Water softener diagnostic 5 - B
The water history of maximum flow rate. Use the water softener up and down buttons to select the water softener hours of the day from water softener screen 5.

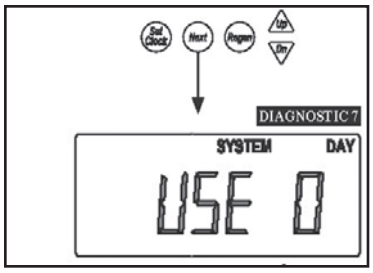
The water softener maximum flow within the watch softener selected hour.

Water softener automatically toggles

Water Softener Diagnostic Screens Continued:

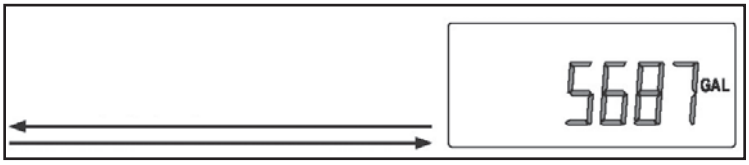


Water softener diagnostics 6
Water softener total volume through the water softener.

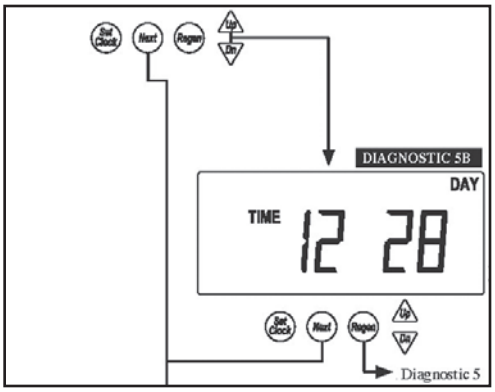


Water softener diagnostics 7
Water softener system totalizer for the last 63 days.
Water softener only displays in a mater system.

Water softener use for that day



Water softener automatically toggles

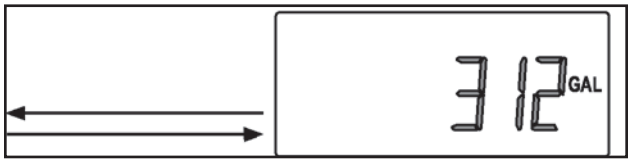


Simultaneously press water softener up and down.

Water softener diagnostics 7 - B
The water softener hourly system totalizer. Use water softener up and down buttons to select water softener hour of day from water softener screen 7

Water Softener Diagnostic Screens Continued:

Water softener total system flow for the selected hour

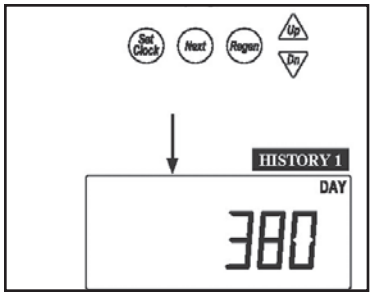


Water softener automatically toggles

Water Softener Valve History:

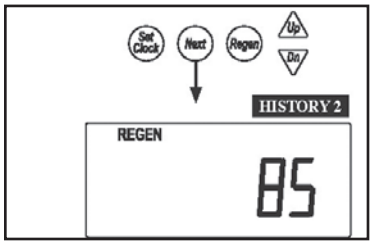
Water softener returns to normal operation after 5 minutes non resettable

Water softener accessed by pressing water softener up and down buttons simultaneously for > 3 seconds, then by pressing water softener up and down buttons simultaneously again for > 3 seconds.



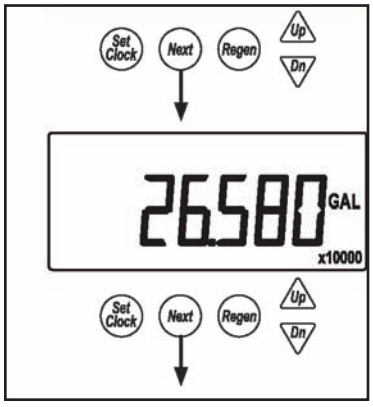
Water softener history 1

Water softener total days since startup. Water softener time only accumulates while the water softener is plugged in.



Water softener history 2

Water softener total regenerations since startup.



Water softener history 3

Water softener total volume since startup.

Water Softener Error Codes:

WS2H/ WS3 Error Codes

Possible Errors	
Code	Description
1001	No Encoder Pulses
1002	Unexpected Stall, Main Drive
1003	Run Time To Long, Main Drive
14001	Message Queue Full
15003	Run Time To Long, Bypass Drive
15010	Run Time To Short, Bypass Drive Could Not Drive Offline
15011	Run Time To Short, Bypass Drive Could Not Drive Online
16001	Communication Lost With Unit 2
16002	Communication Lost With Unit 3
16003	Communication Lost With Unit 4
16004	Regen List Full
17000	Run Time To Long, Separate Source Drive
17002	Run Time To Short, Separate Source Drive
18000	Reset Performed
18001	Power Loss
18002	Power Restored